# Author index


Abgrall, R., Hypersonic calculations by Riemann solvers techniques 65 (1991) 1
Ablowitz, M.J., see B.M. Herbst 65 (1991) 137
Agarwal, R.K. and J.E. Deese, Recent advances in computational aerodynamics 65 (1991) 8

Baillie, C.F., A new MCRG calculation of the critical behavior of the 3d Ising model 65 (1991) 17
Baillie, C.F., see R.G. Brickner 65 (1991) 39
Bergman, C.M., see J.B. Vos 65 (1991) 289
Biringen, S., see G. Danabasoglu 65 (1991) 76
Brandt, A., Multilevel computations of integral transforms and particle interaction with oscillatory kernels 65 (1991) 24
Brickner, R.G., C.F. Baillie and S.L. Johnsson, QCD on the Connection Machine: beyond *LISP 65 (1991) 39
Bruhwiler, D.L. and J.R. Cary, Diffusion of trajectories in a simple Hamiltonian system with slow periodic forcing 65 (1991) 52
Bruneau, C.-H., Least-squares computation of hypersonic flows 65 (1991) 57
Brunet, J.-P., see J.A. Sethian 65 (1991) 231

Carr, L.W. and M.S. Chandrasekhara, A study of compressibility effects on dynamic stall of rapidly pitching airfoils 65 (1991) 62
Cary, J.R., see D.L. Bruhwiler 65 (1991) 52
Chandrasekhara, M.S., see L.W. Carr 65 (1991) 62
Chow, C.Y. and K.H. Kao, Movement of the dividing streamline in unsteady stagnation-point flows 65 (1991) 69

Danabasoglu, G., A. Saati and S. Biringen, Three-dimensional simulations of incompressible and compressible flow stability 65 (1991) 76
Deese, J.E., see R.K. Agarwal 65 (1991) 8
DeGrand, T.A. and R.D. Loft, Wave-function tests for lattice QCD spectroscopy 65 (1991) 84
Ding, H.-Q., Computing quark potential on a parallel supercomputer 65 (1991) 92
Dubois, T., F. Jauberteau, M. Marion and R. Temam, Subgrid modelling and the interaction of small and large wavelenghts in turbulent flows 65 (1991) 100

Feng, K. and M.-z. Qin, Hamiltonian algorithms for Hamiltonian systems and a comparative numerical study 65 (1991) 173

Georges, T.M., see D.R. Palmer 65 (1991) 219
Ghia, K.N., see G.A. Osswald 65 (1991) 209
Ghia, U., see G.A. Osswald 65 (1991) 209
Goodrich, J.W., K. Gustafson and K. Halasi, Time-asymptotic flow calculation 65 (1991) 107
Gozani, J., Two-scale expansion of wave propagation in a random medium 65 (1991) 117
Greenberg, A., see J.A. Sethian 65 (1991) 231

Gustafson, K., see J.W. Goodrich 65 (1991) 107
Gustafson, K. and R. Leben, Computation of dragonfly aerodynamaics 65 (1991) 121
Gustafson, K., Semiconductor device simulation 65 (1991) 133
Gustafson, K., see N.A. Sobh 65 (1991) 253

Halasi, K., see J.W. Goodrich 65 (1991) 107
Herbst, B.M., M.J. Ablowitz and E. Ryan, Numerical homoclinic instabilities and the complex modified Korteweg–de Vries equation 65 (1991) 137
Hereman, W., Exact solitary wave solutions of coupled nonlinear evolution equations using MACSYMA 65 (1991) 143
Hoyle, J.M., F.T. Smith and J.D.A. Walker, On sublayer eruption and vortex formation 65 (1991) 151
Hugo, R.J., see E.J. Jumper 65 (1991) 158

Jauberteau, F., see T. Dubois 65 (1991) 100
Jiang, H., see Y.S. Wong 65 (1991) 310
Johnsson, S.L., see R.G. Brickner 65 (1991) 39
Jones, R.M., see D.R. Palmer 65 (1991) 219
Jumper, E.J. and R.J. Hugo, Simple theories of dynamic stall that are helpful in interpreting computational results 65 (1991) 158

Kandil, H.A., see O.A. Kandil 65 (1991) 164
Kandil, O.A. and H.A. Kandil, Computation of compressible quasi-axisymmetric slender vortex flow and breakdown 65 (1991) 164
Kao, K.H., see C.Y. Chow 65 (1991) 69

Leben, R., see K. Gustafson 65 (1991) 121
Liu, C., Z. Liu and S. McCormick, Multigrid methods for flow transition in a planar channel 65 (1991) 188
Liu, Z., see C. Liu 65 (1991) 188
Loft, R.D., see T.A. DeGrand 65 (1991) 84

Macaraeg, M.G., Investigation of supersonic modes and three-dimensionality in bounded, free shear flows 65 (1991) 201
Marion, M., see T. Dubois 65 (1991) 100
McCormick, S., see C. Liu 65 (1991) 188
Mesirov, J.P., see J.A. Sethian 65 (1991) 231

Osswald, G.A., K.N. Ghia and U. Ghia, Simulation of dynamic stall phenomenon using unsteady Navier–Stokes equations 65 (1991) 209

Palmer, D.R., T.M. Georges and R.M. Jones, Classical chaos and the sensitivity of the acoustic field to small-scale ocean structure 65 (1991) 219
Piomelli, U. and T.A. Zang, Large-eddy simulation of transitional channel flow 65 (1991) 224

Qin, M.-z., see K. Feng 65 (1991) 173

Ryan, E., see B.M. Herbst 65 (1991) 137

Saati, A., see G. Danabasoglu 65 (1991) 76
Sethian, J.A., J.-P. Brunet, A. Greenberg and J.P. Mesirov, A parallel implementation of the random vortex method 65 (1991) 231
Shang, E.C. and Y.Y. Wang, Ocean acoustic field simulations for monitoring large-scale ocean structures 65 (1991) 238
Sivaloganathan, S., The use of local mode analysis in the design and comparison of multigrid methods 65 (1991) 246
Smith, F.T., see J.M. Hoyle 65 (1991) 151
Sobh, N.A. and K. Gustafson, Preconditioned conjugate gradient and finite element methods for massively data-parallel architectures 65 (1991) 253
Sugar, R.L., Numerical simulation of quantum chromodynamics 65 (1991) 268
Swendsen, R.H., Acceleration methods for Monte Carlo computer simulations 65 (1991) 281

Temam, R., see T. Dubois 65 (1991) 100

Vos, J.B. and C.M. Bergman, Chemical equilibrium and non-equilibrium flow simulations using an explicit scheme 65 (1991) 289

Walker, J.D.A., see J.M. Hoyle 65 (1991) 151
Wang, Y.Y., see E.C. Shang 65 (1991) 238
Winters, K.H., Bifurcation and stability: a computational approach 65 (1991) 299
Wong, Y.S. and H. Jiang, Numerical simulations for transonic aerodynamic flows 65 (1991) 310

Xie, G.-q. and Q. Zou, A parallel algorithm for solving the 3D inverse scattering problem 65 (1991) 320
Xie, G.-q., see Q. Zou 65 (1991) 327

Zang, T.A., see U. Piomelli 65 (1991) 224
Zou, Q., see G.-q. Xie 65 (1991) 320
Zou, Q. and G.-q. Xie, A parallel computational algorithm for an inverse problem of low frequency 65 (1991) 327

# Subject index


acceleration methods 281
acoustic field 219
acoustic remote sensing 219
acoustics 30
Adams–Bashforth method 71, 77
adaptive-grid techniques 11
adiabatic invariant 52
aerodynamic heating 12
airfoil model 122
AMT DAP 17
angular density interpolation 34
angular field anterpolation 34
angular rotation 127
anterpolation 27
Antibes Workshop 4
antiquark 85, 93
aperiodic flow 115
Arnold diffusion pattern 180
artificial intelligence technology 16
artificial viscosity 61
asymptotic flow state 107
asymptotic scaling 93
asymptotically smooth kernels 24, 26
attached flows 12
attractor 107

bandwidth 38
baryons 84
bathymetry 219
Bénard convection 301
Bernoulli's equation 57
bi-directional communications 50
bifurcation 299
Biot–Savart interaction 233
Block Gauss–Seidel relaxation 193
block-variable transformations 18
Boltzmann equation 133
boundary-element discretizations 26
boundary-layer equations 153
boundary-layer solution techniques 11
boundary layers 152
Boussinesq fluid 107
bow shock 57
break-up criterion 154
buffer domain method 77

capacitance matrix technique 77
Cauchy problem 117
cavity 115
central-difference algorithms 12
central interpolation 27
chaotic Hamiltonian mappings 54
chaotic orbits 180
chebyshev collocation matrix method 77
chemical equilibrium 289
chemically nonequilibrium flows 1
circuit simulation 134
classical chaos 219
classical simulations 1
coarse-grained parallel processors 253
coarse grid function 28
coarsening 32
coarsening relations 32
compact attractor 100
compressibility effects 62
compressible Couette flow instability 80
compressible Couette flow stability 81
compressible flow stability 76
computational aerodynamics 8
computational fluid dynamics 8
computer-aided-design (CAD) 10
conjugate bandwidth 38
conjugate gradient algorithm 40
conjugate gradient method 259
Connection Machine 39, 41, 76, 84, 231, 254
Connection Machine Instruction Set 42
constrained optimization 24
convective dissipation 122
convective terms 2
convolution 36
correlation function 84
correlation length 17
Couette flow 76
Coulomb gauge 86
coupled nonlinear evolution equations 143
Crank–Nicolson method 71, 77
CRAY X-MP 98, 331
CRAY Y-MP 13, 209, 213, 226
critical phenomena 17
critical slowing down 281
critical temperature 17
CYBER-205 98, 238, 316

*D*-dimensional coarsening 27
Dalton's law 2
DAMOCLES 135
Darboux matrix 176
data-inversion schemes 219

Dean flow 301
decomposability 37
decomposable 36
decomposable periodic convolution 36
dense-matrix multiplication 24
density oscillatory anterpolation 34
design methods 15
deterministic chaos 52
device simulation 134
diatomic species 1
diffusion of the adiabatic invariant 54
diffusion of trajectories 52
diffusive vortex sheet 70
Dirac operator 270
direct numerical simulation 224
Dirichlet boundary conditions 264
Dirichlet conditions 77
discontinuities 11
distributed array processor 19
disturbance stream function 211
dividing streamline 69
double ellipse problem 1
dragonfly aerodynamics 121
drift-diffusion equations 134
Duhammel's principle 119
dynamic pitching 62
dynamic stall 62, 151, 158, 209
dynamic stall vortex 65
dynamical systems theory 100
dynamical Wilson fermions 39
dynamics of trajectories 52

Eddies 100
Eddy-viscosity coefficient 13
Edinburgh's values 21
efficiency 98
El Niño 241
elastohydrodynamics 25
electron transport 133
Elitzur's theorem 86
Elliptic-hyperbolic partial differential equation 310
Elliptic partial differential equations 299
Elliptic problems 24
Enthalpy 4
Enthalpy of formation 1
Entropy 3
Euler and Navier–Stokes equations 12
Euler code 15
Euler equations 57, 290
Euler model 57
Euler pressure 9
Euler solution 9
Euler solver 289
Euler system of equations 2
excess vorticity 71
expert-system technology 16

fared-in inlets 15
fast Fourier transforms 25, 77
fermion matrices 49
ferro-magnetism 17
Feynman path integrals 270
Fibonacci random number generator 95
field corrections 34
field oscillatory interpolation 34
fine-grained parallel processors 253
finite-difference approximation 312
finite-element methods 253, 299
finite-size effects 22
flight-vehicle performance 10
floating-point performance 41
Florida Current 219
flow simulation algorithms 11
flow transition 188
flowfield solutions 10, 11
flowfields 13
fluid dynamics 25
fluid flow phenomena 8
Fortuin–Kasteleyn transformation 281
Fourier acceleration 281
Fourier–Chebyshev collocation method 226
Fourier method 24, 36
Fourier transform 37

Galerkin approximations 107
Galilean transformation 205
gauge transformation 269
general relativity 25
generating functions 175
generic fuselage configuration 12
generic helicopter fuselage 15
global optimization 24
gluon 93
Goldstone boson 278
Grassmann algebra 270
grid-embedding techniques 11
grid-generation 10
group renormalization methods 25

hadron mass spectrum 268
hadron propagators 84
hadron spectroscopy 85
hadron spectrum 275
hadron thermodynamics 268
Hamiltonian 18
Hamiltonian algorithms 173
Hamiltonian dynamics 219
Hamiltonian system 52, 173
harmonic oscillator model 2
Harten's entropy 4
helicopter flowfields 15
helicopter rotor blades 62
high-Reynolds flows 24
high-speed free shear flows 201

Hirota's system 143
homoclinic instabilities 137
homoclinic orbits 138
Hopf bifurcations 111, 299
hovering-mode dynamics 124
Howarth variables 201
hybrid algorithm 19
hybrid molecular dynamics algorithm 275
hybrid Monte Carlo algorithm 40
hyperbolic conservation laws 12
hypercube computer 92
hypersonic calculations 1
hypersonic flows 1, 57, 289
hypersonic high-altitude flight 8
hypersonic nozzle 1
hypersonic wind tunnel 1

ICL DAP computer 17
image processing 25
image reconstruction 24
incompressible flow stability 76
incompressible flows 207, 231
incompressible irrotational fluid 121
indicators 108
inertial manifolds 100
integral equations 24
integral transforms 24
integrodifferential equations 25, 118
internal energy 1
invariant tori 182
inverse problems 24, 327
inverse scattering problem 320
inviscid Euler solution 15
inviscid solutions 15
inviscid subsonic flow 11
Ising antiferromagnet 287

KAM theorems 182
kinematic viscosity 76
kinetic energy 108, 113
Korteweg–de Vries equation 137, 143
KRAKEN normal mode code 243
Kutta condition 160

Lagrangian formalism 173
lambda vorticies 80
laminar-turbulent transition 151, 224
Landau–Teller 2
Lapwood convection 301
large-eddy simulation 224
large-scale computer simulation 17
lattice gauge theory 84, 268, 281
lattice Monte Carlo calculations 84
lattice quantum chromodynamics 92
lattice simulation 84
left eigenvectors 2
Levey–Lee-type transformation 165
linear elliptic equations 24
Lisp code 39
local mode analysis 246

MacCormack scheme 76
Mach number limits 159
Mach numbers 1, 4, 15, 57, 62, 82, 168, 201, 289, 310
macroscopic equations 25
MACSYMA 143
Marangoni convection 301
Mark IIIfp 99
massively data-parallel architectures 253
massively parallel computerhardware technology 16
material sciences 25
matrix multiply algorithms 44
max norm 120
MCRG calculation 17
meshsize 31
meson spectroscopy 85
mesons 84
mesoscale eddy 239
Metropolis updates 19
MINIMOS codes 135
mixed elliptic-hyperbolic transonic equation 12
modal ocean acoustic tomography 238
Moffatt vortices 109
molar mass 2
molecular dynamics 25
Monte Carlo computer simulation 17
Monte Carlo method 94, 281
Monte Carlo renormalization group (MCRG) method 17
Monte Carlo simulation 133
morphological instability 301
Motorola processors 96
multidisciplinary design optimization 16
multigrid fast solvers 24
multigrid-like procedure 60
multigrid methods 188, 246
multilevel computations 24, 25
multiple-scale expansion 117
multipolynomial interpolation 27
multiscale computation 24
multisoliton solutions 143
multistep process 10
multiwire news 47
Murman–Cole technique 12

*N*-body problem 234
narrow bandwidth 25
Navier equations of elasticity 253
Navier–Stokes equations 69, 80, 100, 107, 154, 164, 188, 193, 209, 224, 231, 311
Navier–Stokes predictions 15
Navier–Stokes pressure 9
Navier–Stokes solver 76, 124, 159
nearest-neighbor connectivity 19
nearest-neighbor interaction 94

Neumann boundary conditions 77, 235, 264
Newton linearization 57
Newton–Raphson algorithm 43
Newton–Raphson iteration 302
Newtonian formalism 173
NLS hierarchy 141
node–node communication 96
nondissipative method 57
nonelliptic systems 24
nonequilibrium chemistry 293
nonequilibrium inviscid flow 289
nonequilibrium vorticity field 74
noninertial reference frame 210
nonlinear dynamical systems 110
nonlinear elliptic equations 135
nonlinear Galerkin method 100
nonlinear hyperbolic system 57
nonlinear integral geometry equation 321
nonlinear Schrödinger equation 137
nonlinear steady-state partial differential systems 24
nonperiodic convolution 37
normal pressure gradients 153
numerical simulations 1

ocean acoustic tomography 238
ocean structures 219, 238
one-dimensional coarsening 26
optical-electronic technology 265
Orr–Sommerfeld equations 77, 188, 196
oscillatory kernels 24, 25, 30
Osher splitting 2
Osher's method 4
Osher's Riemann solver 1
over-relaxation algorithms 281

*P*-order interpolation 32
pair correlation function 17
panel methods 11
parallel algorithm 320
parallel data structure 231
parallel elliptic solvers 231
parallel implementation 231
parallel N-body solver 231
parallel processing 25
parallel supercomputers 92
parallelizable multilevel techniques 24
Paris 41
Park's model 2
partial density 1
particle interactions 24
partition function 283
pattern formation 301
percolation problem 281
performance 96
periodic convolution 25
periodic forcing 52
periodicity 37
phase-space 52, 100, 138
phase-space trajectories 52
phase transitions 17, 281
PISCES 135
pitch-up maneuver 212
pitching motions 121, 158
planar channel 188
Poiseuille flow 76, 188
Poisson equation 77, 126
potential-type kernels 25
Potts model 281, 283
power law 17
preconditioned minimal residual algorithm 314
preconditioned over-relaxed minimal residual algorithm 40
pressure distribution 15
process simulation 134
pseudo-spectral method 104

quantum chromodynamics 39, 84, 93, 268
quantum device simulations 133
quantum mechanics 25
quark 85, 93
quark–gluon plasma 268
quark masses 40
quark potential 92
quark propagator 86

radar constraints 16
Ramm's integral equation 325, 327
random medium 117
random-phase coefficient 54
random vortex method 231
Rankine–Hugoniot conditions 61
rapidly pitching airfoils 62
ray theory 219
Rayleigh–Bérnard problem 137
Rayleigh number 300
real-time interactive analysis 16
recursive algorithm 33
renormalization group 281
renormalization type methods 101
Reynolds-averaged Navier–Stokes equations 13
Reynolds numbers 1, 71, 76, 82, 122, 151, 156, 188, 209, 231
Riemann invariants 2
Riemann solvers techniques 1
Roe splitting 2
Roe's Riemann solver 1, 3
rotor surface pressure 13
Router hypercube network 255
Runge–Kutta scheme 289

scale transformations 18
scaling exponent 22
scattering function 118
Schwarz–Christoffel grid generation procedure 212
second-order phase transition 17
selective summation technique 117

semiconductor device simulation 133
semiconductors 25
separated flows 12
separatrix 53
separatrix-swept phase space 53
sharp gradients 11
shell-model wave functions 86
shock-capturing algorithms 12
shock waves 291
shocks 12
short wavelength fluctuations 18
SIMPLE pressure correction method 246
sine-Gordon equation 143
singular points 303, 305
sinusoidal potential 52
Smagorinsky model 228
softened kernels 29
solid-state 25
solitary wave solutions 143
Sommerfeld equation 77
space shuttle 57
spatial stability 76
spectra 84
spectral collocation technique 201
spectral density 108
spectral nonlinear simulation code 205
spectrum 84
speedup 97
spin operators 18
stability 299
stall angle 65
state equations 1
static equilibrium 257
statistical mechanical models 18
statistical moment equations 117
statistical physics 25, 281
steady aerodynamics 121
steady-state position 72
Steger–Warming splitting 1
strain-rate tensor 13
stream function 78, 108, 126
stream function contours 198
stroboscopic schlieren images 62
subgrid modelling 100
sublayer eruption 151
subsonic flows 152
suction peak 15
supercomputers 39
supersonic disturbance 205
supersonic flows 1, 152
supersonic modes 201
surface grids 14
surface pressure distribution 10
Swendson–Wang algorithm 19, 284
symbolic manipulation programs 143
symmetric coupled Gauss–Seidel procedure 246
symplectic geometry 173
symplectic map 52
symplectic product 174
symplectic Runge–Kutta schemes 177

Taylor–Couette flow 301
temporal stability 76
thermal ignition 301
thermodynamic limits 25
thermodynamic systems 281
Thinking Machine Corporation 41
three-dimensional free-shear flows 206
three-dimensional grids 15
three-dimensional Ising model 17
three-dimensional shear flows 202
three-dimensional simulations 76
time-asymptotic dynamics 107
time-asymptotic flow 107
time histories 66
time series 113, 115
Toda system 180
Tollmien–Schlichting periods 78
total-variation-diminishing schemes 1, 12
trans-atmospheric vehicle projects 1
transient effects 21
transitional channel flow 224
translational temperature 5, 6
transonic aerodynamic flows 310
transonic flows 1
transonic full-potential equation 12
transport-like equations 117
turbulence 9, 13
turbulence modeling 12, 13
turbulent flows 100
twin-jet transport aircraft 15
two-dimensional cascade flow 107
two-dimensional flow 69, 158, 231
two-dimensional nozzle problem 1
two-four scheme 76
two-scale expansion 117

uniform grid 26
unsteady aerodynamics 121
unsteady compressible Navier–Stokes equations 11
unsteady Navier–Stokes equations 209
unsteady stagnation-point flows 69
unstructured grid code 14
unstructured grid technology 11

variable particle density 29
vectorized communication 92, 96
velocity-vorticity equations 210
vibrational energy 1
vibrational models 2
vibrational nonequilibrium flows 1
vibrational temperature 2, 5, 6
virtual processors 233
Volterra integral equation 117
vortex breakdown 164
vortex flow 164

vortex formation 151
vortex methods 231
vortex shedding 151, 301
vortex structures 122
vorticity 78, 232
vorticity distribution 69
vorticity transport equation 212

wave-function tests 84
wave propagation 117
Weitek chips 41
Weitek processor 96
Wilson fermions 86
Wilson parameter 40
wing surface 14
Wolff's cluster algorithm 17
Wolff's single-cluster variant 19

Yang–Mills field 180

zonal-grid technology 11